

ART. II.—*On the Endemic Influences of the United States.* By SAMUEL FERRY, M.D., of New York.

BELIEVING that the subject of *endemic* diseases presents a field that well deserves to be farther cultivated—that a knowledge of those peculiarities of physical circumstances, the aggregate of which constitutes climate, which coexist with certain forms of disease, is a department of medical science that includes some of its essential principles—the attempt has been made, in two articles published in this Journal (Nos. 1 and 3, New Series), to supply, so far as the data would allow, this desideratum in our professional literature. Were the facts sufficiently precise and numerous for scientific generalization, it would prove a profitable inquiry to trace the various relations of the endemic diseases of different countries, with all those physical causes and moral agencies which influence the human organization. This has been attempted in part, as just observed, by a comprehensive induction of facts in regard to pulmonary and rheumatic affections, intermittent and remittent fevers, diarrhoea, dysentery, &c.; but as in these researches, the influence of climate as modified by the nature of soil was not sufficiently considered, the object now in view is to generalize these isolated facts, which are only valuable so far as they tend to establish general laws.

Endemic influences are recognised rather by their effects than demonstrative properties; and as they are the result of the conjoined operation of physical phenomena and moral conditions which constantly vary, the effects are correspondingly modified. When we reflect that endemic influences are the consequences of a multiplicity of causes, as temperature, prevailing winds, locality, as regards elevation, or the vicinity of large bodies of water, geological formation, soil, vegetation as respects culture or a state of nature, &c., in their various conditions and combinations, in connection with the influence exerted on the human frame by occupations, modes of life, and moral agencies, the diversity and importance of the resulting effects can no longer excite surprise. In investigating endemic causation, it is necessary to consider the social, moral, political, and intellectual conditions of the inhabitants—their privations and comforts—their states of filth or cleanliness—as well as the agency of these diversified causes in developing or counteracting one another. Thus the influence of locality is exhibited in the comparative effects of mountainous situations and low malarious positions upon the physical and moral condition of their inhabitants respectively; and conversely, these moral and physical conditions, as has been demonstrated, both in the old and the new world, are improved by the alterations effected in the face of nature by the march of civilization. A similar result is witnessed in the beneficial effects of change of air from a crowded city to the

open country. No sooner does the permanent resident of a large city, labouring under that deterioration of health which has been termed *cachezix londinensis*, leave the

"Chaos of eternal smoke
And volatile corruption from the dead,
The dying, sick'ning, and the living world,"

than the etiolation or blanching stamped upon his countenance vanishes, and the glow of ruddy health usurps its place. As in the corporeal structure, different effects result from the dry and restless air of the mountain, compared with those evidenced in the moist and sluggish atmosphere of the valley; so, as regards the mental manifestations, the observation of the poet is founded in nature—

"An iron race the mountain cliffs maintain,
Foes to the gentler manners of the plain."—*Gray.*

As climate, in its medical signification, constitutes the aggregate of all the external physical circumstances pertaining to each locality in its relation to man, it becomes necessary, in the investigation of this subject, to study well the nature of the soil, and the geological formation peculiar to such locality. As the emanations dissolved in atmospheric moisture, which arise from the stratum of comminuted mineral substances and organic remains, composing the crust of the globe, not only influence health but modify the organism, the importance of the geographical descriptions here presented will appear in the sequel.

In the United States, the face of the country presents the variety of plain, mountain, valley, and table-land, having primitive, transition, secondary, and alluvial formations. From New Brunswick to the mouth of the Hudson, with a trivial interruption in the peninsula of Cape Cod, the sea washes a coast of primary rocks often presenting bold projecting cliffs. This region, as far to the northwest as the St. Lawrence river, consists of primary rocks, if we except three narrow belts of secondary strata. This primary region, following the course of the highlands, extends into Pennsylvania, and then continues, under formations of a more ambiguous character, as far as Alabama, having for its eastern boundary the tertiary and cretaceous strata of the Atlantic Plain, and for its western the great valley lying at the base of the Blue Ridge, and farther to the southwest one of the parallel mountain groups.

The great secondary deposit lies chiefly to the northwest of the Alleghenies, extending to the lakes and westward beyond the Mississippi. The alluvial deposits cover vast tracts, the most considerable being that interposed between the Atlantic shore and the Allegheny mountains. This extensive level tract, little elevated above the level of the sea, and gradually widening from a few miles in breadth in the north to upwards of 150 miles in the south,

has been appropriately named the *Atlantic Plain*. A ledge of primary rocks over which the rivers fall, and to which, in the northern section, the tide penetrates, marks very distinctly the western limits of this tract, along which line are found Trenton, Philadelphia, Baltimore, Georgetown, Fredericksburg, Richmond, Smithville, Camden, Augusta, Milledgeville, and Columbus.* At the last named point, the ledge recedes to the northwest through Alabama and Mississippi, until the Atlantic Plain is merged into the valley of the Mississippi. Among the physical features which characterize this plain, which slopes gently down to the ocean, are extensive morasses and swamps, sluggish streams, and wide arms of the sea penetrating far inland. It is composed of tertiary and secondary cretaceous deposits, the former consisting of alternating beds of sand, clay, and sometimes marl, all abounding in marine fossil shells. As the soil, formed of the alluvion brought down by the mountain streams, is of a humid nature and abounds in organic remains, it follows that effluvia noxious to man are generated in a ratio with the increasing temperature of season and latitude. This alluvial zone, which skirts the coast from the Hudson to the Lower Mississippi, extends along the banks of that river beyond the confluence of the Missouri.

As the physical aspect of a country, the nature of the soil, and its vegetable productions, are intimately connected with the character of climate, a detailed description becomes necessary, to be enabled to estimate properly its endemic influences: but, in the present instance, the country to be described is of so vast an extent as to preclude anything beyond the most general outlines. Following, to some extent, the classification adopted in the two preceding articles, the *Northern Division* of the United States will be first described.

The *New England States*, notwithstanding much of the soil is fertile and tolerably well adapted to the cultivation of maize, wheat, rye, and other cereals, have the general character of ruggedness and sterility. Of *Maine*, *New Hampshire*, and *Vermont*, originally covered with dense forests, the greater portion still continues in its primeval condition. The last two are hilly and mountainous, the elevations in New Hampshire rising in height as they recede from the ocean, until they finally swell into the lofty grandeur of the White Mountains, the great central knot of which consists of rocky pinnacles shooting up to the altitude of from 5000 to 6500 feet. Encircling the base is a forest of heavy timber; then succeeds a belt of stunted firs; next a growth of low bushes; and still further up only moss or lichen, or lastly a naked surface. On these summits snow lies during ten months of the year. *Massachusetts*, *Rhode Island*, and *Connecticut*, partake of

* The fact that nearly all the principal cities of the Atlantic states have arisen upon this boundary, from the obvious motive of seeking the head of navigation, affords a striking example of the influence of geological causes in distributing population, and thus determining political relations.

the general character, the last having some rich alluvial tracts. Of *New York*, the greater part of which lies on the great Allegheny table-land, most of the soil is of a useful quality, and much is highly fertile. The central part of the state, extending from the valley of the Mohawk westward to the lakes, is the district of wheat, which is the great agricultural staple.

Passing over a description of the great inland seas, which constitute one of the most striking characteristics of the physical geography of the United States, *Michigan* comes next under notice. The Lower Peninsula is, in general, slightly undulating, a great part of the surface being densely covered with forests, which are interspersed with "oak openings," plains, and occasionally prairies. In point of fertility, it is not, perhaps, surpassed by any other tract of equal extent in the world, the alluvial lands in the southern part consisting of a rich vegetable mould from 3 to 6 feet in depth. Of the Upper Peninsula less is known, there being some lofty ridges which are said to rise nearly 2000 feet above the level of Lake Superior. The vast tract of *Wisconsin* and *Iowa*, exceeding in dimensions, by one third, the whole kingdom of France, is a part of the great central table-land of North America. It has a general elevation of from 800 to 1200 feet above the level of the ocean. In the northern part, much of the soil is of an inferior quality; but the southern section contains fertile prairies, which, forming wide expanses, stretching as far as the eye can reach, are only here and there interrupted by a belt of woodland skirting a river, or by a small grove or clump of trees resting like an island in the midst of the ocean. The whole unwooded tract of the northwestern states, constitutes one vast prairie, partially intersected by strips of woodland, forming a striking contrast to the immense forest, which, extending from Hudson's Bay to the Gulf of Mexico, and from the Atlantic to beyond the Mississippi, is even now but slightly encroached upon by the labours of man.

As the states belted by the Atlantic Plain possess many features in common, they will be reserved for the last in description. Passing then by *New Jersey*, *Pennsylvania* demands our notice. Stretching quite across the great Allegheny system, it is naturally divided into three strongly marked regions, viz. the Atlantic slope, the Central mountain region, and the Ohio and Erie table-land. Abounding in noble rivers, this state has inexhaustible agricultural and mineral resources. It may be here remarked, that in regard to a classification of soils, the nomenclature commonly received, will be adopted; such as the term, *sandy* or *arenaceous*, *clayey* or *argillaceous*, *loam*, which is a medium soil composed of clay and sand, and lastly, *vegetable mould*, which contains a large quantity of decomposed vegetable matter. *Ohio*, *Indiana*, and *Illinois*, possess some characters in common. Consisting of table-land elevated from 500 to 1000 feet above the level of the sea, whilst the surface seldom presents any considerable elevations above this general

level, these states, as regards the nature of the soil, exhibit, in popular acceptance, four principal varieties, viz.—1. The alluvions of the river valleys, called bottoms; 2. The forests, consisting of a dense growth of gigantic trees, and a thick undergrowth of shrubs and vines; 3. The prairies, or unwooded lands, richly covered with grasses, and a gay profusion of flowering plants; and 4. The “barrens,” or “oak-openings.” The prairies are more extensive and numerous in Indiana than in Ohio, and still more so in Illinois. The “oak-openings” partake of the character of the forest and prairie, being covered with scattered oaks, interspersed with other forest trees springing from a rich vegetable mould. The soil is everywhere, even to the summits of the hills, productive, and in general, exuberantly fertile. On all the streams are belts of rich alluvion of exhaustless fertility. The productive industry is almost exclusively agricultural, such as wheat, Indian corn, hemp, and tobacco. The state of *Missouri*, with the exception of the southwest portion, which is traversed by numerous ridges of the Ozark mountains, presents similar features. *Kentucky* and *Tennessee* are both mountainous in the eastern portion. In many parts, the soil is exceedingly fertile; and much of it, in its primitive state, was densely wooded with a forest of majestic trees, and a thick undergrowth of gigantic reeds, called cane-brakes. In *Arkansas*, the eastern border to the distance of from 30 to 50 miles from the Mississippi, consists of low grounds, interspersed with numerous lakes and swamps, and annually overflowed, with little exception, by the inundations of the Mississippi, Arkansas, and other streams. The surface of this swamp presents in ordinary times a succession of lakes, bayous, cypress lands, and marshy ground. The ponds, whose depth does not ordinarily exceed 3 or 4 feet, are mostly filled with very large cypress trees growing in the water. The marshy ground is covered with trees of immense size, principally gum and sycamore in the lower places, and in the higher and more dry, whiteoak and hickory, and occasionally dense cane-brakes rising to the height of 30 feet. The valleys are often inundated to the depth of from 15 to 25 feet.

The states skirted by the Atlantic Plain, which will be found to play an important part in the production of endemial causes, remain to be described; and of these the descriptions will be as brief as practicable. Of *New Jersey*, the northern portion is traversed by several mountain ranges, whilst the southern section consists of the low plain to which reference has just been made, being covered with extensive pine forests, not, however, without many patches of good land. *Delaware*, with the exception of the northern part, lies wholly on the Atlantic Plain. The soil, which is generally light and sandy, is occasionally rendered productive by marshes and the river deposits. These river deposits, consisting of a black mud composed chiefly of vegetable fibre, sometimes attains a depth of 50 feet. As the lowlands are very flat, with an argillaceous substratum impervious to water, the ponds which originate

from rains and springs, as they become dammed up by fallen trees, leaves, and brushwood, naturally expand into broad basins, termed marshes. These are covered with a black vegetable mould from one to six feet in depth, in which the proportion of organic matter is so great, that the soil, if accidentally ignited during a dry season, will continue to burn until extinguished by rain. These phenomena, observed in this state, are no doubt common to the entire Atlantic Plain, or rather augment with the decrease of latitude. In *Maryland*, we meet at the falls in the Susquehannah above Port Deposit, and in the Potomac above Georgetown, the first well-defined ridge, which, separating the lowlands from the Atlantic Slope,* may be regarded as a step to a higher plain. In *Virginia*, as the limits of the state extend quite across the great Appalachian chains, four natural divisions are presented, *viz.*—1. The Tide-water region below the falls of the rivers; 2. The Middle region, between the falls and the Blue Ridge; 3. The Great Valley between the Blue Ridge and the Allegheny Mountains; and 4. The Trans-Allegheny region, west of that chain. The Atlantic Plain exhibits the usual features of deep ravines scooped out by the action of running waters, through which flow broad and sluggish streams; and the primary ridge over which the rivers flow into this low country, is about 150 feet high. In each of these divisions, the phenomena of vegetation are modified in accordance with the diversity of climate on the same parallels. On the lowlands, tobacco is the chief staple; in the Great Valley, its culture succeeds only in the southern portion; and beyond the Allegheny, it ceases to be cultivated. In the first only is cotton cultivated, and in the southern part quite extensively. The *Carolinas* and *Georgia* are divided into three strongly marked regions. In North Carolina, the Atlantic Plain, extending from 60 to 80 miles from the sea, forms, as it were, a chaos of land and water, consisting of vast swamps traversed by sluggish streams, expanding ever and anon into broad basins; whilst in South Carolina and Georgia, it is covered with a forest of pines, known under the name of “pine barrens,” dotted with numerous swamps and savannas. In North Carolina, the Middle region gradually merges into the mountainous country farther west, where the table-land has an elevation of perhaps 1000 above the sea, upon which rise many crests, one of which, the Black Mountain, has an elevation of 6,426 feet—the highest summit on this side of the Rocky Mountains. In South Carolina and Georgia, the Middle region consists of a zone of sand-hills, from 30 to 40 miles wide, interspersed with swamps and valleys producing shrubs and trees indicative of a more generous soil. In the three regions of these states, there are found great diversity of climate and corresponding difference in the vegetable kingdom. The hilly and mountainous region, irrigated by clear, rapid,

* The term *Atlantic Slope* ought to be confined to the district, which, commencing with the abrupt rocky limit of the lowlands, extends gently upwards to the base of the mountains.

and pleasant streams, and blessed with a mild climate and productive soil, contrasts strongly with the hot, sultry, and malarial region of the lowlands. The geographical description just given is applicable to *Alabama* and *Mississippi*. Here the Atlantic Plain recedes in a northwest direction; and from being in New Jersey only a few miles wide, it has gradually attained a width of 150 miles. The western border of Mississippi, skirting the river of that name, consists mostly of swamps, marshes, and lagoons; and between Memphis and Vicksburg, the broad and extensive low grounds are subject to frequent inundations, to the distance of 10, 20, and even 30 miles from the Mississippi. This extensive tract, called the Mississippi or Yazoo Swamp, assumes, during the prevalence of high floods, the character of a marine forest more than that of a woodland bottom. The soil of Mississippi presents three well-defined varieties:—1. The bluffs adjacent to the Mississippi overflow; 2. The alluvial margins of the rivers; and 3. The pine-forest lands.

There remain yet to be described the *Floridas* and *Louisiana*. Belonging entirely to the Atlantic Plain, no part of Florida rises more than 200 feet above the level of the ocean. South of latitude 28°, it consists chiefly of a vast morass called the *Everglades*. North of this point to the Georgia line, the surface is mostly a dead level, with scarcely an undulation. The ridge dividing the waters east and west, is not more than 150 feet high, and disappears at Lake Tohopekalika. This northern portion is an extensive pine forest, interspersed with ponds, swamps, low savannahs, and hammocks, which last are rich bottoms overgrown with trees and a redundant underwood. The barrens are covered with forests of pine with little undergrowth, and are composed principally of silicious sand, more or less mixed with calcareous and vegetable matter; but a rich soil for cultivation is found along the coast, on the banks of rivers, or in those dense jungles, called hammocks, which seem to have been once lakes. The savannahs, which are covered with a tall grass, are inundated during the wet season. The river-swamps are wooded with a variety of heavy trees, whilst the pine-barren swamps are mostly overgrown with cypress and cypress-knees. The nature of the rock formation—a kind of stratified rotten limestone—explains the phenomenon of the frequent bursting forth of full-grown rivers from the surface. The Natural Bridge on the Santa Fe, for example, is a shelf of calcareous rock, beneath which the river disappears, and, after flowing for the distance of three miles, again emerges from its dark labyrinth; and to the same cause are owing the numerous cavities in the ground called *sinks*.* Although Middle and Western Florida partakes of the same features, yet the soil is more productive. In consequence of the extremely modified climate of the

* Many of these phenomena were witnessed by the writer in 1836–7–8. Since then, the waters of Lake Tuskawilla, perhaps a mile in length, near the post of Micanopy, suddenly disappeared subterraneously, leaving its inhabitants upon dry land. Orange Lake is running off in a similar manner, about 10,000 acres having been completely drained.

Peninsula, the indigenous vegetation is exceedingly various, comprising, besides the vegetable productions of the southern states, many of a tropical character. The palmetto, or cabbage-palm, the liveoak, the deciduous eypress, and some varieties of the pine, are common farther north; but the lignumvitæ, mahogany, logwood, mangrove, cocoa-nut, &c. are found only in the southern portion. Here also the fig, date, orange, lemon, citron, pomegranate, banana, olive, tamarind, papaw, guava, &c. as well as cotton, rice, sugar-cane, indigo, tobacco, maize, &c. find a genial climate.

Louisiana belongs nearly altogether to the lowlands, the surface presenting numerous depressions, with some hilly ranges in the northwestern part. Below latitude 31° , the greater portion of the surface, with the exception of the tract lying between the Pearl and the Mississippi, and north of the lakes, is not elevated ten feet above the level of the Gulf of Mexico, and is mostly inundated by the annual floods of the Mississippi, or the spring tides of the Gulf. The delta of the Mississippi—a name to which its configuration gives it no pretensions—is an alluvial plain covering an area of 12,000 square miles, having an extreme length of 230 miles, and an extreme breadth of 140 miles. The sea marsh extends westward to the Sabine, varying in breadth from 15 to 40 miles, being nearly on a level with the waters of the Gulf. As the region of the Lower Mississippi is of comparatively recent formation, it may not be unimportant to determine some of the laws which obtain here relative to the deposition of alluvion. A discoloration of the water of the ocean from the deposits of the Mississippi, when thirty miles distant from its debouchement, is perceptible. As the coast is approached, it is found that the bed of the ocean rises one fathom in every mile—the result of the alluvial deposits from the river. As the bed of the ocean in deep water is not disturbed by the force of the billows, this law is found to hold generally. In shallow soundings, however, the soft deposit is thrown, by the force of wind and wave, into ridges and ravines. The delta of the Mississippi, according to the account of a pilot who has lived there nineteen years, has advanced by its deposits, during that period, two and a half miles into the Gulf of Mexico. As the outlets of the Mississippi comprise a line of about 100 miles along the coast, the alluvial lands between these mouths give an addition of 250 square miles, in nineteen years, to our continent. The bar at the mouth of the river keeps pace with this encroachment upon the ocean. Nineteen years ago it was two and a half miles further inland, with twelve feet of water. In its present position it has fourteen feet, whilst the place of the former bar has thirty feet of water. By the operation of the same law, we find at New Orleans, at which point the shallow bar of the river, some centuries ago, may have existed, water thirty fathoms deep. Following out this theory of the deposition of alluvion, it would be interesting to determine the change produced in 5000 years. When these deposits of alluvial matter once rise to the surface of the water, vegetation rapidly suc-

ceeds. Under the genial influence of the sun, all the seeds germinate; those of an aquatic nature live and flourish, whilst the rest quickly perish. As the deposits of mud are now more effectually intercepted, the soil becomes more dry and firm; plants of various kinds begin to spring up, and by and by large trees appear; whilst here and there are still found marsh and swamp, intersected by lagoons and bayous. Thus has the Mississippi constantly pushed forward her delta, gradually encroaching upon the domains of Neptune. Thirty or forty yards from the Mississippi is what is called the second bank, which is higher than the lands behind—a feature common to all rivers. This admits of a ready explanation. Whenever the river overflows its banks, the water, no longer confined to its channel, is diminished in velocity; and as the transportation of alluvion depends upon this rapidity, it is at once deposited—a result favoured by the stems and leaves of vegetables, which perform the part of so many strainers. As this alluvial soil presents the most luxuriant vegetation, it is here that the pioneer of civilization first strikes his axe into the mighty oak of the forest; and it is here that the destroying angel makes his most desolating visitations under the form of febrile endemics. The low lands contiguous to the plantations which border the Mississippi, are annually inundated, and likewise the plantations, when the levee or embankment, made from a few miles above the Balize to the high lands about Baton Rouge on the east, and to Point Coupée, seven miles above Natchez, on the west side of the river, gives way. As the floods subside, much the greater part is left to disappear by absorption and evaporation, and consequently an abundant source of malaria is generated. New Orleans, for example, is not elevated more than eleven feet above the level of the ocean; and when the Mississippi becomes full, the streets are three or four feet below its surface, protected from inundation by the dyke or levee. The insalubrity of this city during the season of high temperature, ought not then to excite our surprise. The water of the Mississippi, though excessively turbid when taken from the river, becomes, when filtered, or allowed to deposit its sediment, clear and palatable.

Having completed the general descriptions in regard to the geological formation of the United States and the character of its soil, reference will next be made to the fact that in proportion as the health and constitution of the natives of a particular locality are modified by its physical circumstances, does the native frame become so assimilated to the climate as not to be injuriously affected by its endemic influences. On the western coast of Africa, for example, the climate is excessively destructive to the British troops, whilst it is genial to the African constitution. So decidedly hostile is the influence of this climate on European constitutions, that two-fifths of the white troops are annually cut off by fevers, whilst the blacks are almost exempt, the mortality of the latter, from all causes, on an average of nineteen years, being only three

per cent. The fact, as reported in the British army statistics, that at certain posts at which the strength of white troops was maintained at 1000, there died in one year 1500, seems to surpass credibility. This susceptibility of the animal economy to be injuriously impressed whenever exposed to endemic influences to which it is unaccustomed, is evidenced by all races of man, and in all changes of locality when this change involves a change of the physical conditions of nature. Man, at the same time, is a cosmopolite. Although more readily assimilated with particular climates than any other animal, yet the natives of every region do not possess the faculty in an equal degree. The natives of tropical regions, on the one hand, and of polar countries, on the other, are speedily cut off by removal to the opposite extreme. The constitution of the negro, for instance, is little fitted to adapt itself to foreign climates. When those from the interior serve at Sierra-Leone, on the sea coast of their own continent, the mortality, according to the British army statistics, is double the ordinary ratio of other troops serving in their native country. In 1817, a regiment of black troops was sent from the West Indies to Gibraltar, on the ground that their services would be especially important in relieving the British soldiers from such duties as require exposure during the heat of the day; but it was soon discovered that the constitution of the negro is unfitted for that climate, as the annual mortality was four times greater than among the European troops during the same period. The inhabitants of the middle latitudes, on the contrary, owing to their habitual exposure to extremes of temperature, and consequent greater vital energy, manifest, in the highest degree, that pliability of functions by which man is rendered a cosmopolite. This susceptibility to the impression of endemic influences is most marked in early years, diminishing with the advance of age; but at the latter period, when the change is made to a more unhealthy locality, the powers of life sink more readily.

As respects the effects resulting from locality, we find, on comparing the inhabitants of northern and intertropical climates, certain peculiarities of organization and functions, that must strike the pathologist as having an intimate relation with the character and treatment of their diseases respectively. In the natives of the torrid zone, the skin assumes a more extensive function than in those of northern regions, thus compensating by its activity for the diminished operation of the lungs, liver, and kidneys, as compared with the northern man. This general connection of climate with the development and activity of these functions, we discover in our own country, on instituting a comparison between our northern and southern regions, or even between the warm, moist, and malarial atmosphere of the Atlantic Plain and the parallel mountain regions. In the warm and moist climate, the changes produced by respiration are diminished, whilst those effected by the cutaneous and intestinal mucous surfaces are increased. In the opposite locality, an augmented activity of all the functions is experienced; in the

nervous and circulating systems, increased tone is evinced—respiration is performed most effectively, and animal heat is generated with a rapidity corresponding with the expenditure on the external surface—thus giving to the constitution a phlogistic diathesis. An explanation of the effects arising from change of locality is thus afforded. The human frame as last described, not being assimilated to the warm and humid atmosphere, and consequently not adapted to its endemic influences, some functional lesions will necessarily ensue. The cutaneous surface not being so constituted as to be qualified to perform the compensating action, the liver evidently acts with increased energy, eliminating the effete elements which accumulate in the circulation. The system of the negro, as his skin is a much more active organ of depuration than that of the white man, is consequently better adapted to the warm, moist, and miasmal climates of the tropics; but, at the same time, we find that this condition of the skin renders him peculiarly liable to the diseases of that tissue, from which the white troops in the West Indies, and on the western coast of Africa, are comparatively exempt. In the cold and dry atmosphere, on the contrary, muscular frames and plethoric habits of body predominate, giving to diseases the sthenic character—phenomena which plainly point for an explanation, when we consider the relative electrical states in the opposite system of climate, to an accumulation of positive electricity in the human organization.

Chief Sources and Effects of Endemic Influences.—These have been pointed out to a considerable extent in two previous articles. In the number of this Journal for January last, it was satisfactorily shown that the class of pulmonary diseases, with the exception of tubercular phthisis, is dependent chiefly on atmospheric laws. That the ratio of catarrhal affections, pleuritis, pneumonia, and chronic bronchitis, increases and decreases in proportion as the seasons are contrasted, thus maintaining a direct relation with the extreme range of the thermometer as connected with the seasons, seems to have been fairly demonstrated; or, in other words, it would appear to be a law that in proportion as the high temperature of summer makes an impression upon the system, do the lungs become susceptible, so far as phlogistic diseases are concerned, to the morbid agency of the opposite seasons. These constitute the *predisposing* causes, to which the *exciting* ones of moisture and variability of temperature are subordinate. The error of ordinary observation has arisen from the circumstance that the former are less obvious than the latter. As vicissitudes in temperature are more appreciable by our senses, it is to such that our attention is most attracted; and it could not have been *a priori* inferred that the effects thus produced are of less importance than the predisposition arising from the law just stated. Hence we have an explanation of the fact that the diseases of the pulmonary organs generally are less rife along our northern frontier than in the middle States, and less prevalent in our northern region in the moist and changeable cli-

mate peculiar to the sea-coast and large lakes, than in the dry atmosphere of the opposite locality; and hence, too, is afforded a rational explanation of the advantages to be derived from change of climate in the way of a winter residence.

So potent is the influence of early opinion, that the ideas of phthisis and a changeable climate, seem almost inseparable. In countries, however, in which the disease occurs most frequently, "those who are *least* exposed to its influence are precisely those *most* exposed to the vicissitudes of the climate."^{*} Now as it has been satisfactorily ascertained that the maximum of liability to phthisis in England is found among those who suffer the least exposure to climatic variations, it follows that the influence of the latter must be regarded as secondary to the action of other causes, as, for example, occupation, food, and habits. Although it cannot be doubted that a changeable climate exercises an evil influence on constitutions predisposed to phthisis; yet, as we find that the most variable climates are best adapted for the development of the various mental and bodily powers, it is apparent that the agency of this cause in the production of phthisis has been much exaggerated or much too exclusively considered. Confirmatory of these remarks is the observation of Dr. Rush, that among our Indians and the frontier inhabitants, phthisis is very uncommon. In further corroboration of the general views expressed in relation to the class of pulmonary diseases, it may be stated, that notwithstanding moisture, of all the physical qualities of the air, has been regarded as the most injurious to human life, it is also stated in the Appendix to Louis on Phthisis, that as regards its agency in the production of this disease, all evidence "tends strongly to expose the fallacy of theoretical opinion."

In regard to rheumatic affections, the laws developed in the article just referred to, bear a close analogy to those of the lungs; but this analogy would, no doubt, be more marked, if the inquiry were limited to cases of the acute form, the term rheumatism being generally loosely applied to a host of disorders having no character in common save that of pain. Of the fact that the application of cold, more especially when combined with moisture to the body when unusually heated, is the chief exciting cause of acute rheumatism, there can be little doubt; but when we reflect that for every instance of rheumatism so induced, numbers continually endure a much greater exposure to the alleged causes with impunity, it follows that still more depends on the predisposition. Now this predisposition is said to be given by many circumstances, as age, temperament, climate, and even hereditary liability. As regards the influence of climate, it would appear that acute rheumatic affections, like those of the lungs, are less dependent on mere variations of temperature, than upon its extreme range as connected with the seasons, the former being an exciting and the latter a predisposing cause.

* Cowan's Additions to Louis on Phthisis.

In the July number of this Journal, the class of diseases investigated are those of malarial origin, which are dependent not only on purely atmospheric causes, but some of the other physical phenomena which concur in forming the climate of a locality, as the geological formation, the nature of the soil, the abundance and exuberance of the vegetable creation, and the state of agricultural improvement. The soils most productive of endemic diseases are those abounding in organic remains, as low marshy places and grounds subject to inundation—the deep alluvial earth found near the level and shores of the sea or large lakes, on the banks of rivers more particularly at their embouchures, and in the bottom of valleys, more especially if these soils have an argillaceous substratum—and lastly, thick wood or jungles, particularly in warm climates. But the development of these influences has a close relation with the degree of temperature, the condition of moisture, as well as the extent of exposure to the direct rays of the sun. Rice grounds are found to be particularly insalubrious, from the circumstance that a low, wet, and rich soil, abounding with vegetable matters undergoing decay, is exposed, after repeated irrigations and inundations, to the action of a powerful sun. Whilst the inhabitants of our northern States are much subject to endemic diseases, when exposed to localities in our southern States, which admit only of a rice cultivation, the dark races, owing to the adaptation of their organization to these physical circumstances, are little liable to them. Inundations producing an admixture of fresh and salt water, from the circumstance that the latter contains a great quantity of animal matter, are supposed to render low grounds, when the surface becomes exposed to the sun's rays, particularly insalubrious.

A low, moist, and rich soil, when exposed to the action of the sun, by being cleared of its vegetable productions, especially in tropical climates, emits more noxious emanations than in its unreclaimed state, until it is completely brought under cultivation. The history of the United States, in every portion furnishes numerous proofs of the position that, although cultivation renders a climate drier and more salubrious in the end, yet for some years after the forest is cut down, and the ploughshare turns up the soil to the action of the sun, its endemic diseases assume a more severe form. Protected, in a great measure, from the sun's rays by the exuberant vegetation, which also by the evaporation and transpiration from the leaves diminishes the temperature, the surface yields less noxious exhalations, (a great portion of which seldom rises above the higher foliage of the trees,) than when the earth itself, in its cleared state, becomes exposed, during our intense summer heats, to a much more exalted temperature. Added to which, the constituents of the soil, so far as regards animal and vegetable remains, are much richer than the decayed vegetable matter on the surface. It is remarked by Dr. Rush, in reference to the endemics of Pennsylvania, that intermittents and mild remittents were converted, from this cause, into

bilious and malignant remittents and destructive epidemics; and that it was not until after years of cultivation, that general salubrity followed. With the advance of civilization, analogous results, epidemics being grafted on endemics as the parent stock, have been observed throughout the United States. That our troops suffer less from disease in the region of East Florida, which is still in a state of nature, than in the cultivated district of our southwestern posts, can, therefore, be easily understood. It is true that this may in part be ascribed to the circumstance that in the latter the summer heats are higher; but, on the other hand, we find that in the cultivated portion of East Florida bordering on Georgia, as well as in Middle Florida, disease is more rife than in the Peninsula generally.

Among the various circumstances connected with the production and diffusion of noxious exhalations from the soil, it is generally believed that the presence of dead animal matter, when mingled with vegetable remains in a state of decay, gives rise, in warm countries or in the hot seasons of temperate climates, to miasms, especially during humid states of the atmosphere, of a more deleterious character than those resulting from vegetable remains alone. The same causes which render vegetation luxuriant, bring into existence immense swarms of insects and reptiles, the exuviae and dead bodies of which mingle with the decayed vegetation. In addition to high temperature and humidity favouring decomposition, they, in conjunction with richness of soil, produce succulent plants, which, as they contain largely of saccharine and oleaginous principles, rapidly pass through the alternate processes of growth and decay. Moreover, marshy places and alluvial soils, in warm countries, yield vegetable productions which contain less of tannin, resin, the terebinthates, &c., than in cold climates, in which these antiseptic principles abound; whilst the former also contains a much greater proportion of animal matter undergoing decomposition.

Many of the circumstances connected with the production and diffusion of malaria, as the degree of atmospheric temperature and humidity, and its state as respects the winds, were noticed in the last number of this Journal. Sometimes the most pernicious exhalations arise when there is no humidity in the atmosphere, but then the protracted dryness has caused fissures in the upper strata of the soil, through which the noxious moisture of the lower, especially if absorbent or argillaceous, is exhaled. If the atmosphere is often renewed, the concentration of the effluvia emitted, however productive their sources may be, is prevented. High winds and thunder storms are the means employed by nature to dilute or entirely dissipate these noxious agents. It has been long since observed, especially in warm climates, that when the air, hot and moist, has been long undisturbed by these violent commotions, endemic diseases assume the most aggravated character. Electricity also seems to have an intimate connection with endemic causes. If the atmosphere is warm and moist, there arises a disturbance in the equi-

brum of its electrical conditions, as well as its electrical states relative to the animal economy. These diversified circumstances just enumerated, which operate with such intensity in our southern low lands, are not devoid of influence, especially during the high temperature of summer, in our northern regions; but here, during low ranges of the thermometer, and particularly in the system of climate characterized by great dryness of the atmosphere, the human frame no doubt enjoys a complete immunity from terrestrial emanations; and here, as an accumulation of positive electricity in the human frame is experienced, the activity of all the functions is increased, the constitution acquires the phlogistic diathesis, and diseases present the sthenic form.

As regards the effect of endemial influences respecting malarial causes, these were illustrated in reference to several forms of fever, diarrhœa, dysentery, &c., in the last number of this Journal. Endemic fevers are modified, from the mildest intermittent to the most malignant remittent, by the particular circumstances in which they originate, and by the constitution and predisposition of the patient. As these vary, so do intermittents present every type and complication, and remittents, numerous grades and forms. The one may pass into the other, and either be followed by dysentery or other lesions. They may commence mildly and insidiously, passing rapidly into dangerous complications; they may begin in great excitement, and terminate speedily in death or recovery; they may present great depression, *ab initio*, the powers of life never rallying, with a tendency to rapid dissolution of the body as soon as respiration ceases.

The facts developed in regard to intermittent fever are of more than ordinary interest. As the region of New England, New Brunswick, and Nova Scotia, as established by the American and British army statistics, is exempt from this variety of fever, whilst in that of the great lakes it is very prevalent, and as the coast of the former exhibits climatic features similar to the other, so far as regards temperature and humidity, it follows that a solution of the question must be sought in the admixture of terrestrial emanations dissolved or suspended in atmospheric moisture. Not only does the coast of New England, along which the military posts are situated, possess an immunity from ague, but likewise the interior; for it is stated by Dr. Smith* that "on the Connecticut river, from Northampton in Massachusetts to its source, a distance of more than 200 miles north and south, and on all its tributary streams on both sides for 100 miles in width, there has been no instance of any person having contracted the intermitting fever, from the first settlement of the country to the present time." Now it is apparent that these diverse results must be influenced not only by the nature of soil, but the geological formation. If the latter consists of the *debris* of sandstone and other rocks, forming a coarse and gravelly substratum through which the rain percolates

* Dr. Smith on the Etiology of Epidemics, New York, 1827.

and flows off, favoured still more by the undulating surface of a soil which is dry, sandy, and gravelly, no deleterious agents will be exhaled; but if the geological structure consists of tertiary and cretaceous secondary deposits, with a deep, rich, clayey, and absorbent soil, more especially if low and flat, with an argillaceous substratum impervious to water, it will yield by evaporation nearly all the rain which falls upon it, thus carrying into the atmosphere a portion of decayed animal and vegetable matter, (the decomposition of which its moisture promoted,) or perhaps some new resulting compound. Now as the region of New England, with little exception, has a primitive formation with a sandy and sterile soil, whilst that of the lakes consists of a secondary formation, having not unfrequently an alluvial superstratum composed of a rich vegetable mould, from three to six feet deep, it is not difficult to deduce the correct inference. In the former, the geological formation is destitute of organic remains, and the little contained in the sandy soil does not find enough of moisture to induce the necessary chemical action; whilst in the latter, not only is the geological structure of secondary origin, but the deep, rich soil is sufficiently humid, when a high temperature acts upon the organic remains with which it abounds, for the development of the morbid poison, called malaria. If we follow the Atlantic Plain and the parallel mountain region from the Delaware to the Mississippi, the same law in regard not only to intermittent fever but all other malarial diseases, is found to obtain: for the one has a temperate climate, a soil comparatively free from organic remains, and a surface which allows no stagnant waters; whilst the other, consisting of tertiary and secondary cretaceous deposits, all abounding with marine fossil shells, with an argillaceous and alluvial soil, dotted with marshes and furrowed by sluggish streams, has a hot and sultry atmosphere. A similar contrast within limits still more circumscribed, is afforded in the well known fact that the resident of our southern lowlands is peculiarly subject to malarial diseases along the margins of streams, lakes, and marshes, whilst he is exempt in the adjacent sandy pine woods; and this observation finds further illustration, from the writer's personal knowledge, in portions of two adjoining counties of Maryland, *viz.*, Frederick and Baltimore, the former with an exceedingly fertile soil being very rife with diseases of malarial origin, whilst the other, termed the "barrens," with a sterile, sandy, and undulating surface, being wholly exempt. And proceeding up the Mississippi and its tributaries—a valley of secondary formation and alluvial soil—we find that malarial diseases still prevail; and on the prairies of the far west, and even the table-lands of Ohio, the summits of whose highest hills are rich in organic remains, but more especially along the margins of streams, the same class of diseases are dominant.

In regard to the relative prevalence of the different *varieties* of intermittent fever, it is impracticable to furnish any statistical results, inasmuch as all the cases of fever of this type among our troops were reported under the

specific term. Again, each type is liable to certain modifications, having their origin in idiosyncrasy, or on what has been termed atmospheric temperament; but to describe the symptoms by which these modifications are characterized does not comport with the object now in view. Suffice it to say that *simple uncomplicated* ague almost exclusively prevails in our northern latitudes. The *inflammatory* variety occurs throughout the United States, but more especially in warm climates during the cold season, and in persons of a previously healthy constitution. Owing to its common occurrence in sound constitutions, it yields readily to active treatment; but when neglected, or improperly managed in hot climates, it passes rapidly into the remittent type. Intermitents partaking more or less of an *adynamic* character, occur rarely in our northern States; but they are often met with in our southern latitudes among the debilitated and intemperate, especially northern persons who have long resided in this region. They are rarely observed uncomplicated with visceral congestions, constituting the *malignant* form of some writers. These complications may be with the abdominal, the pulmonary, or the cerebral organs. As *masked* or *anomalous* intermitents occur most frequently in localities in which the disease is very rife, or seasons in which it is very prevalent, so they are met with more frequently, under like circumstances, in proportion as southern latitudes are reached. They assume diversified forms, numerous diseases, especially those of the nervous system, putting on an intermittent type. In regard to the consequences and terminations of intermitting fever, it may be said that it seldom continues long, even in the simple form of our northern States, without materially impairing the vital energy of the viscera of the large cavities, particularly those of the abdomen. Hence arise the complications just referred to, the supervention of the remittent or continued type, or a fatal issue in consequence of an insurmountable congestion in the cold stage; and as sequelæ, we observe chronic diarrhœa and dysentery, dropsical effusions, inflammation, and structural changes of internal organs. Whilst in our southern regions, death frequently takes place during the paroxysm, in consequence of the vital powers being overwhelmed; in our northern, it sometimes occurs, when the disease is prolonged and obstinate, the vital powers being worn out by the effects of some local lesion.

That intermittent fever has a tendency to septenary revolution is a fact that was frequently verified in Florida under the writer's observation; and this too in a manner so unequivocal, that it attracted the notice of the common soldier. At these septenary periods, either after the seventh, fourteenth, or twenty-first paroxysm, the disease has a disposition to terminate spontaneously. It is at these periods that febrifuge remedies act with the greatest success; and as regards relapses, it is then, too, that a vast majority occurs—a circumstance of such frequent occurrence in Florida, that soldiers would voluntarily come to the hospital to obtain medicine to prevent its return.

The causes productive of *remittent* fever, as in the intermittent form, as was shown in the July number of this Journal, are generated most abundantly under a high temperature, the third quarter of the year presenting invariably the highest ratio, and the annual average increasing with the decrease of latitude. Some of the cases included in this class were reported under the term *congestive* fever, which has been generally substituted for *bilious remittent*, of late years, by the physicians of the south and west; but whether this is owing to an improved pathology, or a change in the character of the disease, is uncertain. Perhaps both causes have operated in producing this change of nomenclature. We know, at least, that in a country partially cultivated, deleterious agents are generated, causing endemics of a character more malignant than when the surface was in a state of nature. As congestion, however, may be associated with intermittent, remittent, or typhus fever, giving each a marked character, it does not serve to designate a fever, so much as it does a modification which may occur in any variety of fever, and at any period of it. Identical with the malignant or pernicious remittents, or the intermittent ataxic fever of continental Europe, it is yearly met with in the south of Europe; and as such was long ago accurately described by Torti and Riverius, and in our own day by Rubini and Bailly. The accounts of these writers, more especially those of Italy, as well as Cleghorn, Lind, Pringle, Johnson, &c., in other regions of the world, would be readily taken as highly descriptive of congestive fever on the Mississippi. Congestion of a morbid kind is common in nearly all fevers, and is not limited to any organ. Thus in winter epidemics, the thoracic organs are the chief sufferers; and in autumnal ones, the brain and abdominal viscera experience the greatest lesions.

As regards remittent fever, if we define it to be a disease attended by distinct paroxysms of fever alternating with remissions, its affinity to intermittent fever is apparent; and if, on the other hand, it be defined as a variety of continued fever, characterized by very evident and distinct exacerbations, it seems to have a like affinity to the latter. That it is, however, intimately allied with intermittent fever, is clearly established by statistical results—an opinion confirmed by their analogous origin, their associations, their organic lesions, and their tendency to assume each other's character. In our northern regions, remittent fever usually assumes the simple and inflammatory character; whilst in the districts of southern latitudes, in which the miasm is generated, every form of the disease prevails, and in places near its origin, or in low ill-ventilated localities, the malignant form more especially is experienced. But individual constitution also exerts a great influence, both in regard to primary susceptibility, and the subsequent character of the disease. Generally speaking, in those of a plethoric habit, the inflammatory variety prevails, and among the weak and languid, those debilitated by previous disease or intemperance, the malignant form is most apt to supervene. The

adynamic or malignant form, more especially if complicated with congestion and inflammation of the viscera of the large cavities, is one of the severest and most fatal of endemic fevers, being observed in places in which the endemic causes are intense, and concentrated relatively to the state of predisposition, and being ushered in by a prolonged sense of cold, and a universal collapse of the vital powers, and of vascular action. In warm miasmatic climates, the inflammatory variety frequently attacks sanguine plethoric individuals from northern latitudes, attended in the most severe and unfavourable cases, with yellowness of the skin, or vomiting of matters resembling coffee-grounds, or both. This, as well as the modification referred to above, are considered by many as differing essentially from epidemic yellow fever.

In regard to *Yellow Fever*, there has always existed great contrariety of opinion, both in reference to its nature and origin, arising mainly from the fact that its phenomena are much modified by climate, and especially by temperature, season, and locality. By some, it is associated with typhus fever; and by others, it is regarded as a variety of remittent fever. It is now, however, with few exceptions, viewed as a specific disease, some referring it to lesions of the solids, and others to disorganization of the fluids. Without reference to individual liability to this disease, as influenced by age, sex, constitution, and occupation, it may be said that the development of its causes requires a climate in which the mean summer temperature is not less than 75° , and perhaps 80° ; and hence the localities liable to its occurrence include almost every point in the vicinity of the ocean between the latitudes of 40° N. and 20° S. of the equator. That yellow fever is never found above the height of 2500 feet, was long since observed by Humboldt. At Stony Hill, in Jamaica, elevated 1300 feet above the level of the sea, and with a mean annual temperature of 70° , it is only of occasional occurrence, and rarely epidemic. At the height of 4200 feet, where the vegetation of the tropics gives place to that of temperate regions, the inhabitants enjoy a complete exemption from the scourge of yellow fever, and the violent bilious remittents which cut off thousands annually along the coast. The opinions in regard to the causes of yellow fever, may be arranged under three heads:—1. That it is a disease induced solely and essentially by contagion; 2. That it is essentially of endemic origin; and 3. That being of endemic origin originally, it becomes contagious.

The doctrine that not only intermittent and remittent, but yellow fever, assume, according to circumstances, more or less the type of one another, has been extensively entertained. In the British and American army statistics, nearly every case of *febris icterodes* characterized by black vomit, is reported under the head of "*remittent*." Believing them to arise from similar causes variously modified, to assail the system through the same avenues, and to require the same general treatment, these fevers are re-

garded by this class of reasoners as essentially the same, modified by the intensity of the cause and peculiarity of constitution. This position is strongly confirmed by the oft observed fact, that the natives of our southern cities, in which yellow fever is endemical, possess, in a great measure, an exemption from this malady; for, whilst intermittents and mild remittents prevail among the old inhabitants, yellow fever manifests itself so exclusively among those lately arrived from northern latitudes, that it has received the name of "*Stranger's Fever*." Some of our most experienced writers, as for instance Dr. Rush, have sustained these views. We are not justified, however, in the present state of our knowledge, to assert that the same miasma which produces remittent fever, excites, in its more virulent state, yellow fever, or indeed that the latter is of paludal origin.

The opinion that yellow fever is communicated by contagion, now scarcely finds an advocate in the United States—a fact which, at New Orleans, the experience of almost every year exemplifies. Situated on a mighty river's bank, formed of the alluvion of its own current, this emporium may be regarded as a healthy locality during nine months of the year. As the summer temperature increases, yellow fever appears almost with the certainty of the varying seasons, and disappears as regularly when the scale of the thermometer indicates its decrease. Although vessels laden with fugitives from malarious pestilence, ascend the stream by hundreds at this period; yet the disease, notwithstanding the fatal *black vomit* appears on the decks as they pass along, is never manifested among fellow passengers from uninfected regions; nor is it, under like circumstances, communicated to the inhabitants of the district to which they may fly. It is, therefore, purely a disease of season and locality. It may be worthy of observation, that whilst at New Orleans and Gibraltar, the same individual is seldom twice attacked by yellow fever, in the West Indies and on the west coast of Africa, it is said to secure no subsequent immunity.

Whether certain fevers which have, or are supposed to have, their source in vegetable miasms or in effluvia from marshes, ever subsequently spread by contagion, is still a disputed point. In regard to yellow fever, it has been observed that its imported causes engendered in the holds of ships navigating in hot climates, when suffered to escape at the wharves of our northern cities, will affect those only who come within the sphere of its influence, the disease being never known to spread epidemically. A cause of this kind would no doubt fall harmless upon the inhabitants of a salubrious country locality.

To develop this malignant fever, seems to require the conjoint operation of both local and general causes, constituting an *endemico-epidemic*, which is unsusceptible of propagation by specific contagion; and in the summer atmosphere of a crowded city, more especially if a maritime position, there appears to exist some peculiar agency favourable to its development. In

these cases, there is generally found an "infected district," which slowly and regularly extends its boundaries, rendering all who come within its limits, subject to this form of fever. In our northern cities this has been repeatedly observed. Whilst the common remittent fever is found in the United States wherever intermittent fever prevails, the true yellow fever is nearly altogether confined to the Atlantic Plain or tide-water region extending from New York to New Orleans. The experience of several centuries teaches us that the cause of this fever is perennially present in our southern cities. Indissolubly connected with climate, it seems to maintain the same relation towards the human system as the other malarious emanations of our southern lowlands, and to be liable, at any time, to be developed, in different grades of intensity, by the combined operation of heat and other agents. Amid the conflicting evidence in regard to the etiology of this disease, the following conclusions seem to be fairly warranted:—1. That it is solely and essentially of endemic origin. 2. That it is never contagious under ordinary circumstances of cleanliness and ventilation; and 3. That as regards the local causes, at least in the United States, a soil rich in organic remains, and an atmosphere more or less modified by the sea, appear to constitute necessary conditions.

One of the strongest predisposing causes of this as well as other epidemics would seem to be the summer atmosphere of a crowded city—a result doubtless owing to a diminution of vital energy, as evidenced in the condition of the system termed *Cachexia Londinensis*, though by no means peculiar to that metropolis.

Continued fevers are modified by such varied combinations of causes, both in respect to the individual and external agents, that every attempt at arranging them must necessarily be more or less conventional. The classification into synocha, synochus, and typhus, is perhaps as good as any other. From the statistical results furnished by the writer in the last number of this Journal, it appears that these fevers are uninfluenced by the seasons and climate generally. To the majority of American physicians, the fact will appear strange that in the British Islands probably not above one practitioner in fifty entertains any doubt of the infectious nature of continued fever, comprising synocha, synochus, and typhus. In France and Germany, however, the opposite doctrine is generally adopted. The arguments in favour of contagion are drawn chiefly from personal observation, during many years, of the fever at Edinburgh, as well as from the history of epidemics of fevers in other large towns. As no connection can be traced with season, temperature, moisture, winds, barometric pressure, or any other appreciable condition, the opinion that it is irreconcilable with any supposition but its transmission by communication from the sick to the healthy, seems favoured. It is maintained that all the forms of primary continued fever are communicable; and that even synocha or pure inflammatory fever, when

prevailing with synochus and typhus in the epidemic form, constitutes no exception. The infection of continued fever is, however, generally, by no means virulent, cleanliness and ventilation being sufficient to prevent its propagation.

That the purely inflammatory fever of our own country is never infectious, can scarcely be doubted, and the same may be said of the ephemeral synocha of all other regions. The peculiar character given to acute diseases among the working classes of the British isles, by the influence of predisposing causes productive of debility, as will be more fully shown, is happily among us unknown. *Ephemeral* fever with us arises from exposure to the sun, vicissitudes of temperature, excessive muscular exertions, emotions of the mind, &c. *Inflammatory* fever, in cold and temperate climates, especially elevated situations, is apt to arise from atmospheric vicissitudes and other causes; but in warm countries, during dry seasons, this variety of fever, in a severe form, may be said to be endemic, more particularly among those from northern latitudes. Those lately arrived in the West Indies, more especially soldiers and sailors, are peculiarly liable to attacks of severe inflammatory fever. The predisposing causes of inflammatory fever consist, *first*, in that condition of the frame known under the name of the inflammatory diathesis—high irritability and tonic of fibre, more especially when conjoined with vascular fulness and imperfect performance of any of the secreting and excreting functions; and *second*, of those states of season or climate which tend to produce this diathesis. Hence they occur chiefly among the vigorous and plethoric, and are most prevalent in cold and dry, or very warm and dry climates or seasons. The *exciting* causes are—1. Whatever *directly* stimulates, in an inordinate manner, the nervous and vascular systems, as the intemperate use of stimulating liquors, especially in connection with atmospheric heat or vicissitudes—great bodily exertion—violent mental emotion and excitation—change of climate, more particularly from cold or temperate to very warm and dry regions. 2. Whatever *indirectly* induces great excitement or vascular action, as the impression of cold when the body is overheated and perspiring. Among our troops lately arrived in southern latitudes from northern regions, it is apt to occur after having lain upon the ground, or in the open air, especially when exposed to the night dews—results favoured by inattention to the bowels during the voyage, and the use of salt provisions and vinous or spirituous liquors.

Typhus fever—a term subject to vague and arbitrary application—has also been shown, as just remarked, to be uninfluenced, in the United States, by any appreciable atmospheric conditions. It is regarded by some as comprehending all those fevers in which the characters of adynamia or nervous depression, present themselves as the predominant feature of the disease from first to last; whilst others embrace the still more numerous class of cases in which such symptoms show themselves before the close of the first

week. Typhus thus regarded is not less important than synochus in point of frequency. Of late years, it has constituted in many epidemics, for example in Britain generally and in France, almost the sole prevailing type. In some epidemics, the symptoms of cerebral congestion manifest themselves so generally, and at so early a period of the disease, as to impart a peculiar character to it, described under the distinguishing name of *congestive typhus*. The predisposing and exciting causes of typhoid fevers are not considered to differ specifically from synochoid fevers, the former being more severe. They appear sporadically or epidemically, the animal economy being rendered susceptible to the impression of the exciting causes by whatever depresses or exhausts the vital and moral energies. *True or contagious typhus* is often confounded with synochoid and nervous fevers. Of true typhus, the chief cause is animal miasm, generated by a number of persons confined in a close air, or by the disease itself. Of synochoid and typhoid fevers, the causes prevail more especially in the large manufacturing towns of England and Scotland, and among the poor of Ireland.

In reference to *Diarrhœa* and *Dysentery*, it was shown in the last number of this Journal, that the ratio, like that of intermitting and remitting fever, augments with the decrease of latitude and the increasing temperature of the seasons. North of the 40th degree of latitude, a death from dysentery is very unusual. As these affections, in France and England, generally assume a very mild type, and yield readily to ordinary remedies, we find that the writers of those countries pass over them with comparative neglect. In the United States, however, which has in summer a tropicoid climate, these diseases prevail most extensively in all malarial localities. Without attempting a description of these lesions, it may be remarked, that dysentery in temperate and tropical regions, presents characters so distinct as to merit separate consideration. The distinction lies in the extent of bowel implicated, a larger portion of the intestine being affected with inflammation in tropical climates. This refers to uncomplicated dysentery, the grades of intensity of which vary from the slight sporadic case, which threatens no danger to life, to the fatal epidemic which has so often proved the scourge of fleets and armies. The complications of dysentery are frequently met with in our southern regions. In East Florida, the ratio of diarrhœa and dysentery is nearly the same in each season—a result arising mainly from the great prevalence of chronic diarrhœa, which supervenes upon febrile affections, continues throughout the year, and ultimately in many cases proves fatal. The complication of dysentery with typhus, which occurs under the operation of debilitating causes, as want of food, and neglect of cleanliness and ventilation when many persons are crowded into a small space, has often proved more fatal to the garrison of besieged towns than the assaults of the enemy. Cleanliness is, therefore, the life of an army—the

Jewish code, enjoining ablutions and purifications as religious rites, having been fitly quoted as a system adapted to a camp.

In regard to *Hepatic affections*, it was also shown, in the paper just referred to, that, on comparing the statistics of the United States, British America, the United Kingdom, the Mediterranean stations, and the West Indies, they appear to be little influenced by tropical temperature. It is in the East Indies that hepatitis finds a climate peculiarly favourable to its development. It is now known that the calculation of Mr. Annesley, that the annual per centage of hepatitis in the East Indies is at least treble what it is in the Western hemisphere, falls far short of the reality. It is obvious, however, that the elevated temperature of tropical regions, independent of other causes, is positively detrimental to health. The absorbents of the intestines being maintained in a state of erethism by the constant evaporation by cutaneous and pulmonary transpiration, a morbid condition is readily assumed under favourable exciting influences. Diarrhœa, dysentery, and those bilious derangements which accompany fevers, as well as cholera and hepatitis in a less degree, are consequently prevailing affections.

It has been thus seen, that whilst the southern region of the United States is productive of diseases affecting chiefly the abdominal viscera and the circulating and secreted fluids, the northern districts favour the development of disease in the thoracic viscera, and in the muscular and circulating systems—a contrast also observed on the same parallels when we compare the Atlantic Plain with the elevated, temperate, and dry localities lying adjacent. In the one, as the passage of electricity from the earth to the clouds is favoured, the vital powers are lowered; and in the other, as it accumulates in objects on the earth's surface, diseases of a phlogistic character are induced, as fevers of an inflammatory type, and inflammation of the lungs and the serous and fibrous structures. In conformity to a law of the animal system, that its natural susceptibility to be influenced by morbid agents diminishes by a gradual and protracted exposure, we find that among the acclimated in warm countries, the agency of malaria may be compared to a slow and concealed combustion, whilst in the unacclimated, its effects are evinced in a raging and rapidly consuming flame. Those assimilated to the climate are consequently liable mostly to agues, affections of the bowels, enlargement of the spleen, &c.; but those who have removed thither from cold or temperate regions, are subject to fevers of a violent and often malignant character; and, *vice versa*, the endemic influences of mountainous districts are most deleteriously exerted upon those who have recently migrated from warm malarious situations.

It is said that although the white races of the human family may reach, in warm countries productive of endemic influences, advanced years; yet their offspring will seldom attain maturity, or if so, will very rarely arrive at old age. In these localities, as is often observed in the tide-water region

of our southern States, the human frame is weakly constituted or imperfectly developed, the mortality of children is very great, and the mean duration of life is comparatively short. Along the frontiers of Florida and the southern borders of Georgia, as witnessed by the writer, as well as the lowlands of our southern States generally, may be seen deplorable examples of the physical, and perhaps mental, deterioration, induced by endemic influences. In earliest infancy, the complexion becomes sallow, and the eye assumes a bilious tint. Advancing towards the years of maturity, the growth is arrested, the limbs become attenuated, and the viscera engorged. Boys of fifteen years may be seen bowed down with premature old age, a mere vegetating being, with an obstructed, bloated, and dropsical system, subject to periodical fevers, passive hemorrhages, and those other forms of disease which follow in the train of malaria. But these are extreme cases, which consequently afford no warrant for the exaggerated statement made in two recent British works of deservedly high repute. In the *Cyclopædia of Practical Medicine*, we are told that "in the marshy districts of certain countries, for example, Egypt, Georgia, and Virginia, the extreme term of life is stated to be forty; whilst we learn from Dr. Jackson, that at Petersburg, in the latter country, a native and permanent inhabitant rarely reaches the age of *twenty-eight*." And in Copland's *Dictionary of Practical Medicine*, the same story has received an additional shade of exaggeration, thus—"Dr. Jackson states that white persons, born and residing in the more unhealthy districts of lower Georgia, seldom live to forty; and that at Petersburg, in Virginia, they rarely reach *twenty-five*."

That the continued operation of these endemic influences, as in the lowlands of our southern States, would ultimately depopulate the country, might be naturally supposed. Observation, however, has taught us that, as in epidemics which cause great mortality, the population is only temporarily diminished; for, as the means of subsistence for those who survive have become more abundant, the void is filled up in a few years by a much greater annual average of marriages and consequently of births, as well as by an influx of strangers. Between endemics and epidemics there is a close relation, most of the wide-spreading diseases having the character of endemico-epidemics, the latter being grafted on the former as the parent stock. Destructive epidemics occur most frequently and most violently in low situations and crowded cities—a fact observed in our own country in regard to epidemic cholera. Whilst these influences increase the deaths and diminish the mean duration of life, they tend directly, as just remarked, to augment the ratio of marriages and births; in addition to which, as the means of sustenance and employment, in low alluvial regions, are more abundant than in barren and mountainous districts, the excess of deaths over births is equalized by the influx from more healthy parts. This statement is well illustrated by the following statistical table, furnished by M.

Bossi, Prefect of the Department of Aix, in France, which he has divided into four zones in accordance with its topographical features:—

Locality.	One Death Annually to Inhabitant.	One Marriage Annually to Inhabitant.	One Birth Annually to Inhabitant.
In the hilly districts,	38.3	179	34.8
Along the banks of rivers, &c.	26.6	145	28.8
In cultivated grounds,	24.6	133	27.5
In marshy places, &c.	20.8	107	26.1

Now, did we possess the data requisite to enable us to institute a comparison between the sterile and healthy region of New England and the fertile and less salubrious western States, or between the Atlantic Plain and the parallel mountain regions, these laws would doubtless be confirmed statistically, as they are already by ordinary observation.

As regards the influence of the seasons in the production of fatal diseases, a comparison of our northern and southern latitudes shows a marked distinction. In the July number of this Journal, it was shown, that whilst in the former there is little disparity in the mortality of each month, in the latter the inequality is great in close relation with the increase and decrease of temperature, the ratio increasing from April to September, and then gradually decreasing until the reappearance of the former month. The influence of malarial causes upon mortality is thus illustrated; for, notwithstanding this morbid poison may be generated in our northern regions, yet the diseases developed, as for instance intermittent fever, exert no fatal tendency. As malarial diseases are dominant in southern Europe, so the aphorism of Celsus, conformably to the rule laid down by the Greek and Roman authorities, accords with the relative salubrity of the seasons in the United States, and more especially in our southern latitudes; thus—*saluberrimum ver est—proxime deinde ab hoc, hiems—periculosior aestus—autumnus periculosissimus*. In London, at the present day, according to the "Registrar-General of Births, Deaths, and Marriages," we find this order of salubrity nearly reversed, the fatality of the seasons standing thus—winter, spring, autumn, summer. This is, however, not the case in our northern cities, as for example, Boston, New York, and Philadelphia; and as regards our northern military posts, it is also found that in the malarial region of the great lakes the ratio of morbidity is always highest during the summer, whilst at the posts on the coast of New England, which is exempt from malarious causes, there is little difference in the ratio of cases reported each quarter, the winter being often the most insalubrious season. At Fort Gibson, Arkansas, on the contrary, the ratio of sickness is twice as high in summer as in winter. The same degree of temperature will consequently produce very diverse results; for to the agricultural inhabitants of a non-malarial soil, or to the residents of a city equally favourably situated, winter may prove the most unhealthy season, whilst in marshy districts, or

cities abounding in dead organic matter, summer will be the most insalubrious. According to Mr. Farr, as shown in the First Annual Report of the Registrar-General of Great Britain, in which a comparison is made among seven millions of persons, one half of whom dwell in towns, and the other half in counties, the mortality from epidemic diseases and disorders of the nervous system is doubled by the concentration of population in cities. In towns, as compared with counties, the mortality from consumption is increased thirty per cent.—from childbirth, seventy-one per cent.—and from typhus, two hundred and seventy-one per cent.

The influence of very cold climates on the human constitution is, to destroy the feeble and invigorate the strong; for if the source of animal heat is enfeebled or exhausted by the effect of low temperature acting on the surface of the body, the constitution will be correspondingly enfeebled or life quite destroyed; but if the source of animal heat is so powerful as to resist this external agency, the powers of life will be invigorated. This explanation, for which we are indebted to Professor Pelletan, is equally satisfactory in regard to the phenomena of what is called *reaction* against cold, as well as the effects of cold as a hygienic agent in strengthening the human frame.

There are other agencies, which do not fall within the preceding descriptions, productive of diseases *sui generis*. That the base of lofty mountains constitutes a locality favourable to the development of *bronchocele*, was well known even in the days of Juvenal, as appears by the line

“*Quis tumidum guttur miratur in Alpibus?*”

but its etiology is equally inexplicable now as then. This disease, which has been observed in many parts of the world, prevails endemically in our own country in Vermont, the western portion of New York and Pennsylvania, on the great lakes, and in Virginia. To the same class of endemic diseases, the causes of which are generally no less inscrutable, belong—the pelagra of Italy, the cretinism of the Valais, the hepatitis of Coromandel, the elephantiasis of Malabar and other places, the pliea of Poland, the beriberi of Ceylon, the tarantulism of Apulia, the frambæsia or yaws of the negro race in Africa and the West Indies, the ophthalmia of Egypt, &c. Of these affections, none has been observed United in the States, with the exception perhaps of the *yaws*, which has been seen by the writer among the negroes of Florida. Some of these disorders may be imputed to obvious physical causes, as the ophthalmia of Egypt to the reflected heat and the impalpable sand in the air—pelagra to dirty habits and unwholesome food, &c. Lesions of the nervous system, frequently implicating the mental manifestations, occur oftener in large and crowded towns than in the country, and much more frequently than in states of society not completely civilized—effects resulting from a confined and impure air co-operating with

the exhaustion arising from dissipation or mental exertion, the luxuries of refinement, and the excitement of the various passions and moral emotions.

Besides the endemics here enumerated, there are several others observed in our own country deserving of notice. For example, *nyctalopia*, in our most northern and southern latitudes, especially in Florida, may be regarded as endemic. The pathology seems to consist in an exhaustion of the power of the retina in consequence of exposure to strong light during the day, or in other words, vision ceases because the retina, after being exposed to a long and brilliant sunshine, is not excited by the feeble light which continues after sunset. The disease is, therefore, rarely met with except in southern latitudes, or those regions in which the ground is covered many months with snow. In the West Indies, Europeans, more especially those who are soldiers and sailors, suffer much from this affection. The same causes operating here are found to obtain in Florida, such as the full glare of a vertical sun in an unclouded sky, and the reflection of solar rays from the surface of water or a sandy soil. In Florida, according to the observation of the writer, its duration varies from one night to six or twelve months, whilst relapses are frequent.

Scorbutus is another endemic with which, in its more aggravated forms, we are fortunately in the United States but little acquainted. Our army within the current century, has, with the exception of two periods, been nearly wholly exempt from its ravages. In 1809, this disease complicated with malarial disorders, that is, as the sequelæ of febrile affections, produced dreadful havoc among the troops on the lower Mississippi, 600 having fallen victims. It raged with violence again in 1820, at two of our western posts, *viz.* Council Bluffs near the junction of the Platte and Missouri, and Fort Snelling at the confluence of the St. Peter's and Mississippi. The number of men reported at the former post, on the first of January 1820, was 788, and at the latter 228, making an aggregate of 1016. The total of cases of all diseases reported for the quarter ending the 31st of March, at these two points, was 895. Of these, 503 were of a scorbutic character; and the number of deaths from this cause was 168, of which 157 occurred at Council Bluffs. It appears that both commands were exposed to many of the causes, both predisposing and exciting, of scurvy. During their progress from St. Louis up the Missouri, and from Green Bay up the Mississippi, they were not unfrequently obliged to labour in the water beneath the rays of an ardent sun. Sleeping in their wet clothes, and exposed to a damp atmosphere impregnated with malaria, they became reduced by disease; and in this state of predisposition to scurvy, they began late in the season the establishment of their winter quarters. The weather during the winter was exceedingly cold, the mean temperature for January at Council Bluffs being 8°. 62, and at Fort Snelling 0°. 17 of Fahr. They were destitute of groceries, and vegetable food, except flour and corn, which were more or less damaged from having been wet; and their animal food, which was princi-

pally salted, they were obliged to eat during a portion of the winter in a putrescent state. This condition of the meats, however, was as far as practicable corrected by washing and boiling with charcoal.

The following table, exhibiting the number of cases of scurvy, and the consequent deaths in the army, during a period of 20 years, shows the comparative infrequency of the disease:—

Years.	Cases.	Deaths.	Years.	Cases.	Deaths.
1819	7		1829	6	
1820	734	190	1830	16	
1821	86	5	1831	3	
1822	4		1832	7	
1823	29		1833	5	
1824			1834	15	
1825	8		1835	9	
1826	4		1836	17	3
1827	2		1837	59	1
1828	8	1	1838	159	1

The cases reported in the last three years occurred, nearly all, either in Florida, or amongst troops that had served in those campaigns. The relation of cause and effect is here very apparent; for it can be readily perceived that a diet, consisting mainly of salt provisions, in a constitution deteriorated by repeated attack of remittent and intermittent fever, diarrhœa, and dysentery, will develop scorbutic and cachectic symptoms. The ration of our soldier, regarded in all its component parts, no doubt disposes the system to scurvy in warm countries; and in these campaigns, whenever it proved deficient in any respect, it was always found to be so in reference to the vegetable portion.

From the writer's own official report, made at Fort King, E. Florida, in 1837, the following is an extract:—"Several cases of scorbutus have been presented. The disease manifests itself with most of the symptoms by which it is generally described. Muscular power is completely prostrated, the gums are swollen, spongy, and livid, the legs are anasarcaous, and covered with blotches of extravasated blood, and the nates sometimes, but very rarely, become the seat of bloody abscesses. These lesions gradually yield to the plentiful use of lemon acid and vegetables with vinegar. The only therapeutic means employed in conjunction is, the sulphas quinine dissolved in elixir vitriol. When stationed at Fort Armstrong, several cases of this disease occurred. Deprived of vegetables, they grew worse from day to day, until the free use of wild pepper-grass, (*lepidium virginicum*,) found in a neighbouring swamp, was prescribed. At this post, we have the good fortune to find in great abundance *purslane*, renowned among the older physicians as an antiscorbutic."

In the narratives of the early English navigators, particularly in those of

Sir Francis Drake, Davis, and Cavendish, the destructive ravages of this disease are awfully portrayed. Until the year 1796, it may be said to have been the universal scourge of the sea, having destroyed, it is supposed, more sailors than the terrific consequences of naval warfare and the various accidents incidental to a maritime life combined. It is mentioned by Sir Richard Hawkins that he had known, within his own naval experience, of 10,000 men perishing by the scurvy; and in the course of his voyage around the world, Commodore Anson lost more than four-fifths of his men. Land scurvy, which is a form of disease precisely analogous to that developed at sea, was also of frequent occurrence in besieged towns and garrisons, under the united circumstances of defect in the quantity and quality of food, fatigue, anxiety, and exposure to the influence of a cold and damp atmosphere. In the account of the siege of 'Thorn, at which nearly 6000 of the garrison, besides a great number of the inhabitants of the town, were cut off by the disease, whilst the besiegers, (the Swedes,) were wholly exempt from it, a memorable instance is presented. The prevalence and even great fatality of scurvy, at a former period, in our own country as well as in England, though now happily a very rare disease, are abundantly proved by the records of medicine; but even at the present day, it is occasionally endemic in Iceland and the northern states of Europe, particularly on the shores of the Baltic, where vegetable products form a very insignificant portion of the diet of the inhabitants. This general salutary change may reasonably be ascribed to the united influence of the drainage of the country, the habitual use of fresh vegetables by the people, and to those improvements in our national economy which render the use of fresh meats available at all seasons of the year; and as regards the soldier and the sailor, the operation of these causes is still further promoted by their improved condition in every other respect. The want of fresh vegetables in England, even at the beginning of the sixteenth century, is evinced by the historical fact, that, to procure a salad, Katharine of Arragon, queen of Henry VIII, was obliged to despatch a messenger to the Netherlands.

Another endemic peculiar to the western portion of the United States, being seldom or never observed east of the Alleghenics, is a disease known under the appellation of *Milk Sickness*. This name had its origin in the circumstance that the disease is frequently communicated to man by the use of the milk of an infected animal, though it will be as readily produced by eating the flesh. Beef cattle, horses, goats, and sheep, are the animals in which it has been mostly observed. In cattle, in consequence of the trembling motion manifested by the voluntary muscles, the disease is generally known by the name of the "*Trembles*." Sometimes, the first symptom observed is, that the animal staggers and falls, when death may immediately supervene; or in less fatal cases, life may be prolonged several hours, or recovery eventually take place. The disease, however, may exist in a latent condition, the animal evincing no morbid manifestations, whilst its

flesh and milk will cause the development of the disease in the human system. In man the disease is generally developed from the third to the tenth day from the period of the reception of the morbid poison. The disease is preceded by a peculiar and indescribable factor of the lungs as a premonitory symptom; and so constant is this symptom in its appearance, that it may be regarded as pathognomonic of the forming stage. The general symptoms vary much. Most usually there are at first loss of appetite, restlessness, pain in the head, and intolerance of light, followed in a few days by violent and distressing vomiting, obstinate constipation of the bowels, and general febrile action. A change of volume in the tongue, which quickly attains an inordinate size, being soft and flabby in its texture, and filling the mouth completely, may be considered as characteristic of the second stage. With the disappearance of the peculiar odour from the lungs, the disease no longer presents any specific characters; but now either the vital powers evince mere extreme prostration, or a low typhoid form of fever supervenes. A large majority of cases terminate fatally; and when recovery does ensue in severe attacks, convalescence is very tedious, and often the constitution never regains its former vigour. After recovery, nothing which transpired during the progress of the disease, and even for some days prior to its active development, can be called to mind by the patient.

In regard to the etiology of this singular disease, nothing certain has been determined since it was first noticed by the French missionary, Father Hennipin. It has in turn been supposed to be of mineral, vegetable, and aerial origin; but all observations tend to show that it is somehow indissolubly connected with the nature of soil. Occurring at all seasons of the year, the limits of its prevalence are often confined to an isolated spot, comprising an area of one or two hundred acres, but more commonly to a narrow tract extending even a hundred miles; and the boundaries separating the healthy from the infected districts are the same now as at the first settlement of the country; nor has any locality previously exempt been ever known to acquire the property of causing this endemic. Amongst the early immigrants, whole communities, on account of the prevalence of this malady, were often compelled to seek another location; and even at this day, those who venture within the boundaries of an infected district, are constrained, as a condition of their residence, to abstain from the flesh of the cattle living within the same limits, as well as their milk and its preparations. Of the milk of an infected cow, or the butter or cheese made of it, a very small quantity will suffice to develop the disease in the human system. It is believed to have been produced even by the cream used in the coffee drunk at a single meal. In some of these infected districts, it is said that the inhabitants, with a recklessness of human life that seems incredible, carry the butter and cheese, which they dare not themselves venture to eat, to the markets of the western cities; and that thus are induced morbid symptoms, and even death, regarded by the unsuspecting medical

attendant as some new or anomalous form of disease.* Notwithstanding the infected localities are usually distinctly circumscribed, and the inquiry in regard to the cause of the disease has been prosecuted with much zeal, large rewards having been held out by legislative bodies as an inducement to its successful investigation, yet the endemic agent remains shrouded in mystery.

Equally involved in uncertainty is the pathology of this disease; and in regard to the proper therapeutic means, so much discrepancy exists that it can be accounted for on the supposition only that the morbid manifestations are modified by the nature of the endemic influence. So unsuccessful are practitioners generally in the treatment of this disease, that by many of the inhabitants of infected districts dependence is placed entirely on domestic remedies.

In regard to the mode in which endemic influences produce their effects on the animal economy, there is of course as much difference as there is in the nature of the causes operating. One of the most important circumstances connected with this subject is, the remarkable predisposition given to acute diseases by the previous influence of causes productive of debility; such as excessive and exhausting excitement, as watching, fatigue, or intemperance of any kind; or deficiency of the natural excitements of the human system, as impure air, deficient exercise, imperfect nourishment, long-continued heat or cold, or permanent mental depression. These various influences have been fully illustrated by statistical inquiries into the health and probability of life of the different classes of the community in France and England, and of the inhabitants of towns as compared with those of the country; thus demonstrating that the operation of these debilitating causes, applied long prior to the commencement of any morbid action, gives rise to a great amount of disease and mortality. Hence it follows, that in all epidemics, as, for example, malignant cholera, the permanent residents of cities are peculiarly susceptible; for, in all epidemics, it may be laid down as certain, that whatever tends to disturb the balance of health, favours an attack of the prevailing disease. In respect to endemic influences which constitute the exciting causes of disease, an equally wide field is presented. By Cullen they were supposed to be direct sedatives, not merely depressing the vital powers, but also inducing spasm of the extreme capillaries; and that to overcome this spasm, reaction supervenes, unless the vital energy be completely overpowered, and thus fever is developed. That malaria acts as a specific poison inducing specific phenomena, there can be little doubt; but the endemic causes of mountain regions productive of such diseases as have their origin in a phlogistic diathesis, cannot be regarded as of this character. By Magendie and Stevens it is maintained, that fevers produced

* See the interesting account of this disease by Dr. Graff, in the number of this Journal for April last.

by marsh miasm have their origin in a disorganized state of the blood; but that this is the first link in the chain of morbid phenomena, has not been clearly established. We know at least that the effects of malaria on the living body, both immediate and consecutive, are evinced in depression of the vital powers, contamination of the circulating and secreted fluids, and diminution of the cohesion or vital affinity of the soft solids. And its effects upon dead animal matter is somewhat analogous; for not only has the body, in some malignant forms of endemial fever, a tendency to run rapidly into dissolution as soon as respiration ceases, but in all dead animal matter, in malarious localities, decomposition advances with rapidity, and even articles fabricated of animal substances, as silk or wool, very speedily undergo decay and lose their cohesive property. These effects, however, doubtless have their origin in part in the same causes which favour the generation of malaria.

When we consider the multiplicity of endemial causes, and their various combinations, it follows that the branch of the subject having reference to the preventing of their production and the counteracting of their effects, is one of very great extent. A few words, however, must suffice. As abject poverty is the soil in which most endemic diseases spring up, so they diminish with the progress of civilization and the increase of the comforts of life. It is a remark of the learned Dr. Mead "that it has never been known when the plague did not first begin with the poor;"—a remark confirmed by every pestilential epidemic subsequent to his time, and strengthened by the history of yellow fever and cholera in every country, and of the epidemic fever in the British isles, particularly in Ireland. The diminution of endemial diseases is more especially observable in prisons, in hospitals, and on board of ships, resulting chiefly from stricter attention to diet, cleanliness, and ventilation—circumstances to which the less prevalence of scurvy, dysentery, and cutaneous affections, is mostly ascribable. A host of physical evils, for example, among the poor of the British isles, might be avoided, if luxury would but make a trifling sacrifice of self-indulgence to the public good; and thus by relieving want and suffering, prevent the operation of those debilitating causes which lay the foundation of much disease and mortality. Fortunately in the United States, in which equal rights obtain, these endemic influences arising from the oppression of man by his fellow-man, are not evidenced. With us the chief endemias are of strictly climatic origin; as those of the class of pulmonary organs, with the exception of tubercular phthisis, arise from atmospheric conditions without reference to the nature of soil, whilst those of malarial origin are the result of both conjoined.

From what has been already said it is obvious that if malaria is exhaled from marshy grounds, the most efficient means of preventing it, is either to drain them or to inundate them completely;* but it must be borne in mind

* This mode of prevention is of very ancient origin. Empedocles, the Sicilian philosopher.
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that the mud and soil exposed to the action of the sun's rays, are at first fruitful sources of endemic influence. If inundations from the sea or a river give rise to the marshy locality, the means of prevention will be found in an embankment. In regard to clearing the soil of its vegetable products, it has been seen that the insalubrity of a district is thus, for a time, greatly aggravated; and hence this measure will be beneficial only in the end, and the sooner in proportion as the mode of cultivation requires less irrigation. In a newly built city in a malarious locality, as for example New Orleans, the development of this poison may be prevented, in a great measure, by protecting the soil from the action of the sun by a closely laid pavement—by removing the exuvæ and other impurities, by means of drains and sewers, so as to obviate the escape of emanations from them in the confined locality of a dense population—and by having places of sepulture beyond its outskirts.

Besides preventing the production of malarial poison, there are means of counteracting its effects. Thus high houses or walls, or a range of trees, may serve as a protection. That trees absorb the noxious exhalations, was remarked by Pliny; but whether they actually absorb the malaria, or simply obstruct its transit, or act in both ways, the fact as to the result is indisputable. Consequently the removal of screens which confine the exhalations to their sources will often cause great insalubrity. From this cause, many localities recognised by the ancients as the causes of malaria, and guarded against accordingly, have become more unhealthy; but this increased unhealthiness may also have been promoted by the accession of alluvial soil washed down from higher grounds, in the event of a decrease of population and consequent neglect of drainage and cultivation, or by the accumulation of organic remains and mineral detritus at the mouths of rivers. It has been remarked, and no doubt correctly, that the climate even of Egypt, when it was formerly well cultivated, was more healthy than that of Rome in its decline.

Besides these means, there are others which both destroy and counteract the causes of endemic maladies. For instance, in the case of impure water, the filtering of it through charcoal; and when drains, sewers, &c., cannot be removed or completely covered, the use of the chloruret of lime.

As our chief endemics are of malarial origin, it may be remarked further that the healthiness of a locality, especially in warm climates, depends much on its relation to the course of prevalent winds. The bad effect of a position to the leeward of a malarious source, even temporarily, has been often experienced by encampments or ships at anchor. In the choice of residences, where the winds blow from particular quarters at certain periods of the year or day, and especially at night, a position to windward of the prin-

sophier, according to Diogenes Laërtius, freed the Saluntinians from pestilential diseases, by conveying two streams of running water into the stagnating river round their city.

cial sources should of course be selected. When exposed to noxious exhalations, the diet should be nourishing and easy of digestion. Animal food should be sparingly used, and wine and liquors not at all. Attention should also be paid to the due regulation of the mind; for as the equable state opposes most successfully the impression of both endemic and epidemic influences, so the depressing passions and all undue exertments should be avoided. The susceptibility to infection, in a word, is increased by fear and the depressing passions, general ill health, derangement of the digestive organs, and whatever else impairs the vital powers.

It may be well also to mention a fact of practical importance in relation to yellow fever and other endemico-epidemics. According to the medical reports of the United States army, it is found that the removal of the troops but a short distance from the locality in which the disease originated, frequently caused its sudden cessation. Remarkable instances of this kind are also furnished in the history of the epidemic fevers at Gibraltar; and the statistics of the British troops further show that, in the West Indies and Ionian Islands, whilst one station suffers severely from yellow fever, others within a few miles are entirely exempt. In the epidemic cholera at Montreal and Halifax, the removal of the troops but a short distance was followed by the most happy effects. As the morbid agency manifested in the epidemic form, seems to be often limited to particular localities, it were always advisable on the part of the officer having charge of troops, on the sudden invasion of any serious disease of this character, to take into immediate consideration the expediency of a removal of the command.

In bringing to a close these statistical researches, continued through three articles, the writer may justly claim the indulgence of the reader. Climate, according to the definition of Cabanis, constitutes—*l'ensemble de toutes les circonstances naturelles et physiques, au milieu desquelles nous vivons dans chaque lieu*. But upon most of the branches of meteorology, what is the extent of our positive knowledge? And in regard to the influence which these complex agents, acting upon living organs still more complex in their functions, exercise, what has been effected by the boasted application of the Baconian philosophy to medicine? There are doubtless physical circumstances which cause the shape of to-day's cloud to differ from that of yesterday, but these circumstances, like many endemic causes, have thus far defied our limited powers of observation. It is a noble thought and nobly expressed: *Pulchra sunt quæ videntur, pulchriora quæ sciuntur, sed longe pulcherrima quæ ignorantur*. But will it never be permitted to man, in his present state of existence, to penetrate the mysteries of nature more deeply? It will. As the "possible is immense," so the human mind, if the legitimate object of all science, which is to observe facts and to trace their relations and sequences, is kept steadily in view, will be continually verging towards truth in the investigation of physical causes.